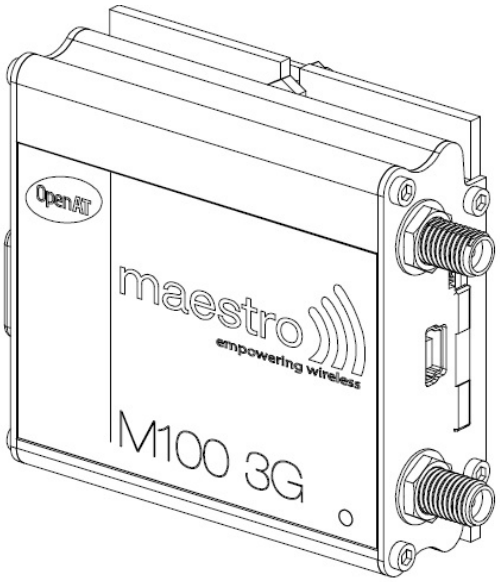

MAESTRO 100 3G

QUICK START GUIDE & USER MANUAL
VERSION 7

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Revision history

Version	Date	Details	Originated by
1	29 Apr 2013	First issue	Samuel Chéreau
2	8 Jul 2013	Added power consumptions details. Corrected typo in Chapter 5 Introduction and known issues.	Samuel Chéreau
3	30 Jul 2013	Corrected product codes listing, typo.	Samuel Chéreau
4	8 Aug 2013	Edited Digital Input/Output details.	Samuel Chéreau
5	28 Nov 2013	Edited Know issues section. Added label details. Finalized temperature and humidity range. Clarified packing details & DIO connection diagrams. Corrected accessories details.	Samuel Chéreau
6	4 Dec 2013	Added details on antenna positioning with GPS	Samuel Chéreau
7	13 Feb 2014	Corrected item codes	Samuel Chéreau

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Safety precautions

General precautions

- The modem generates radio frequency (RF) power. When using the modem care must be taken on safety issues related to RF interference as well as regulations of RF equipment.
- Do not use the modem in aircraft, hospitals, petrol stations or in places where using GSM products is prohibited.
- Be sure that the modem will not be interfering with nearby equipment. For example: pacemakers or medical equipment. The antenna of the modem should be away from computers, office equipment, home appliances, etc...
- An external antenna must be connected to the modem for proper operation. Only used approved antennas with the modem. Please contact authorized dealer on finding an approved antenna.
- Always keep the antenna with minimum safety distance of 26.6cm or more from human body.
- Do not put the antenna inside metallic box, containers, etc.

Using the modem in vehicle

- Check for any regulation or law authorizing the use of GSM in vehicle in your country before installing the modem.
- Install the modem by qualified personnel. Consult your vehicle dealer for any possible interference of electronic parts by the modem.
- The modem should be connected to the vehicle's supply system by using a fuse-protected terminal in the vehicle's fuse box.
- Be careful when the modem is powered by the vehicle's main battery. The battery may be drained after extended period.

Protecting your modem

To ensure error-free usage, please install and operate your modem with care. Remember the following:

- Do not expose the modem to extreme conditions such as high humidity/temperatures, rain, direct sunlight, caustic/harsh chemicals, dust, or water.
- Do not try to disassemble or modify the modem. There is no user serviceable part inside and the warranty would be void.
- Do not drop, hit or shake the modem. Do not use the modem under extreme vibrating condition.
- Do not pull the antenna or power supply cable. Please attach or detach by holding the connector.
- Connect the modem only according to the instruction manual. Failure to do it will void the warranty.

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Chapter 1

Known issues

Beware of the difference between M100 2G, M100evo and M100 3G GPIO type on the 4-pin Microfit connector. M100 3G has two Digital Input/Output.

Below known issues on **M100 3G**:

1. Doesn't support CSD call, updated firmware is R7.52 planed by Sierra Wireless for Q4 2013.
2. DCD, DSR, DTR signals are not currently available on the serial port, updated firmware is R7.53 planed by Sierra Wireless for 2014.

Below known issues on **M100 3G Engineering Samples**:

1. For audio, when a call is initiated, you can hear the other party but the other party cannot hear you.
2. Supports only passive GPS antenna, final product support both passive and active GPS antenna.
3. Doesn't support CSD call, updated firmware is R7.52 planed by Sierra Wireless for Q4 2013.
4. DCD, DSR, DTR signals are not currently available on the serial port, updated firmware is R7.53 planed by Sierra Wireless for 2014.

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Chapter 2

Specifications

- Quad bands GSM/GPRS/EDGE 850/900/1800/1900MHz
- M1003G SKU's:
  - M1003GXT00: WCDMA 850/1900MHz (SL8080T) with USB connector and GPS.
  - M1003GXT02: WCDMA 900/2100MHz (SL8082T) with USB connector and GPS.
  - M1003GXT04: WCDMA 800/850/2100MHz (SL8084T) with USB connector and GPS.
- Memory size: 64Mbits Flash and 16Mbits RAM
- Support Data, SMS, Voice and Fax
- SIM Tool Kit Class 2
- AT command set (GSM 07.05, GSM 07.07 and Sierra Wireless proprietary)

Power supply requirement:

- Input voltage range: 5-32V
- Rated current: 650mA

Typical current consumption:

	@5V	@12V	@32V
Transmission WCDMA @ band 1, +23dBm	250mA	212mA	85mA
Transmission HSDPA @ band 1, +23dBm	250mA	212mA	85mA
Transmission EDGE @ +27dBm	220mA	185mA	73mA
Transmission GSM/GPRS @ +32dBm, 900MHz, 2 slots	220mA	185mA	73mA
Idle (RS232 & USB connected)	99mA	43mA	20mA
Idle (RS232 & USB not connected)	40mA	20mA	13mA

Interfaces:

- SIM Holder
- 15 pin sub-D connector
- 4 pin power supply connector
- SMA Cellular antenna connector (50Ω)
- mini-USB Female port
- SMA GPS antenna connector (50Ω)

Dimensions:

- Overall size: 74.3mm x 60mm x 21.7mm
- Weight: 90g

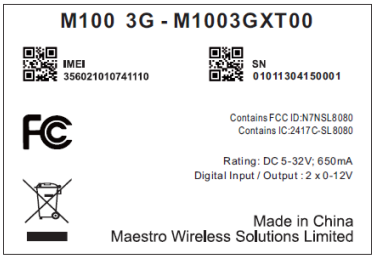
Temperature range:

- Operating: -40℃ to +85℃ with relative humidity below 95%
- Storage: -40℃ to +85℃

CAUTION
In accordance with the European directive EN60590, if the ambient temperature exceeds or might exceed 65℃, it is required that the installer:
- Avoid physical contact with the Maestro 100 3G when the temperature exceeds 65℃.
- Adds a marking on the assembly indicating that this part is hot (for example showing the *"symbol IEC 60417-5041: Caution, hot surface*"; and/or having a wording similar to "*CAUTION - HOT SURFACE - DO NOT TOUCH*").

Front label:

Back label, example of M1003GXT00:



Packing

- Bulk carton box of 50 pieces
- Each M100 3G in single plastic bag without any accessories
- Overall size: 522mm x 212mm x 150mm
- Weight: 4.3kg

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Chapter 3

Related documents

This document presents technical and hardware specifications of the Maestro 100 3G industrial modem. It covers a hardware installation, quick start guide, accessories listing, and troubleshooting details.

This document will not cover the embedded application details, neither the common 3GPP AT command list, for more information please refer to the following documentations available on our website:

- SmartPack User Manual, intelligent embedded application
- Maestro 100 3G - AT command guide
- Application note - Automatic connections
- Application note - Power supply & Audio
- Application note - How to upgrade your modem in 5 steps

Please download related documents on `http://www.maestro-wireless.com/m1003g`

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Chapter 4

Hardware installation

4.1 Mounting the modem

If delivered with the DIN clip accessory, detailed on page 27, use two M3 screws to mount the DIN clip on the back of the modem as shown on figure 4.1.1.

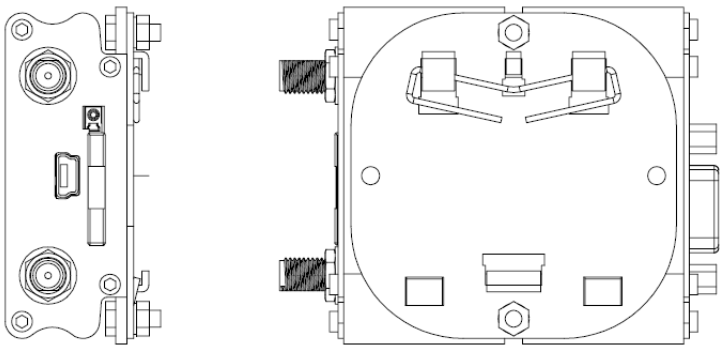

Figure 4.1.1: DIN clip mounted on M100 3G

4.2 Installing the SIM card

Use a ball pen or paper clip to eject the SIM holder by pressing the eject button. Put the SIM card to the tray; make sure it is completely inserted in the tray, then carefully put back the tray into the slot.

Note: DO NOT pull out the SIM holder without pushing the ejector button.

4.3 Connecting the external antennas (SMA type)

Connect both antennas with SMA male connector on the modem, make sure antennas are tightly secured. Select a GSM antenna with the right GSM frequency and an impedance of 50Ω; incorrect antenna will affect communication and even damage the modem. Select a GPS antenna with an impedance of 50Ω; incorrect antenna will affect GPS sensitivity and time to fix.

Note: Make sure to install GSM and GPS antennas with an angle of at least 90º to avoid disturbance. Refer to the drawing on Figure 4.3.1 on the following page.

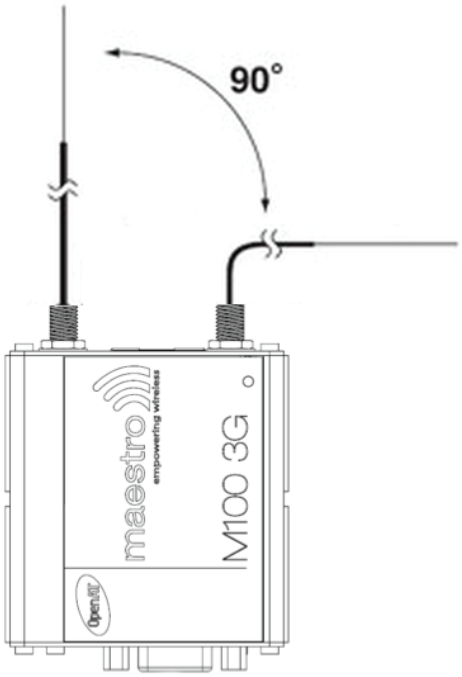

Figure 4.3.1: Antenna position

Note: Respect a safety distance of at least 26.6cm to the antenna during the modem operation.

4.4 Connecting the modem to external device

Use Maestro standard DB15 to DB9 straight cable, detailed on page 26, or a common USB to mini-USB cable, to connect an external controller or a computer. Refer to section 6.2 for more details on some other cable option or adapter.

Note: If the Maestro 100 3G is connected with another DCE device please use a cross cable.

4.5 Connecting the DC power supply

If delivered with the power cord accessory, detailed on page 26, use the open ending of the power cord to connect a DC supply. Refer to the following for power supply requirement:

- Input voltage range: 5-32V
- Rated current: 650mA

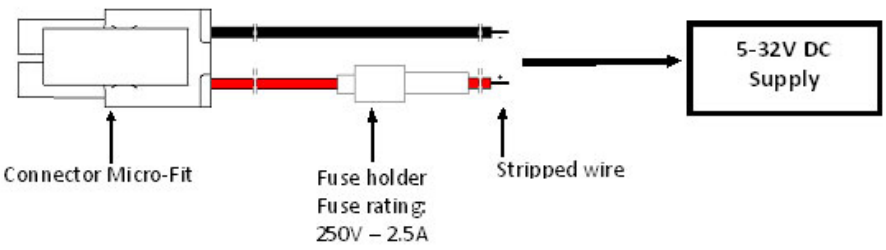

Figure 4.5.1: Power cord not included in the package

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Plug the DC Molex connector of the power cord in the modem and it will turn on automatically. The status indicator led will light when power is applied. After few seconds it will blink slowly, meaning the modem is registered on the network.

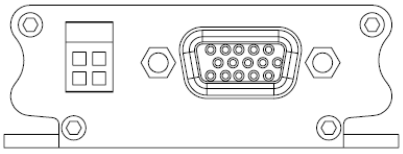

Figure 4.5.2: Side view showing power and serial connector

Note: Modem can also be powered and connected by USB only using the ACC-CA41 Maestro 'X' Cable as detailed in 6.2 on page 26.

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Chapter 5

Maestro 100 3G easy setup guideline

The Maestro 100 3G of the M100 Series is the perfect solution for demanding M2M applications.

Ultra compact and fully-featured, the M100 3G can be integrated easily into any industrial machine from electricity meters to intrusion alarms or vending machines. M100 3G modems are fully type approved, making them immediately usable worldwide. Boasting the reliability the M100 Series is known for, the M100 3G modems are the perfect devices to use in any of your projects facing tough conditions or extended lifetime requirements. Fitted with a standard fifteen pins RS232 port and Windows configuration tool the M100 3G can be set up with minimal effort.

All M100 3G also features two digital input/output pins. The M100 3G XT adds a mini-USB connector and GPS feature.

Maestro 100 3G Series:

- M100 3G XT with USB and GPS.
- M100 3G Tracker: supporting tracking application for GPS based alert report (Q2 2014).

5.1 Downloading the Maestro Configuration Software

Start the web browser of your choice and download the Maestro Configuration Software at this address: `http://www.maestro-wireless.com/configuration-software/`.

Please start the setup.exe application and follow instructions shown on screen. It will also create a shortcut on your desktop.

5.2 Using the Maestro Configuration Software

The window shown on Figure 5.2.1 on the following page will appear when the application starts, you need to enter your COM port settings and click “Connect” button. Default settings are 115200, 8 data 1 stop, parity none, detailed on page 29. The serial configuration settings will be saved upon connection.

Details of Figure 5.2.1:

1. **Com port:** select the correct COM port to use. The box will auto-refresh on click. Selected COM port will be saved after connection.
2. **Serial configuration:** select the correct settings for the serial port, and click “Connect”. Settings will be saved on connection. If modem reply to AT+VAFV command it will automatically switch the window to the “Modem Status” page and if it only reply to AT command the window will switch to “Terminal” page.
3. **Update your modem:** use this tool to upgrade your modem, that handle both firmware and latest Maestro application.
4. **Diagnostics to contact support:** as stated please use this button to generate a report of all common AT command that will help us solve any issue you have with the modem easily.
5. **Auto-detect serial configuration:** will detect your modem serial configuration automatically, though it may take some time.

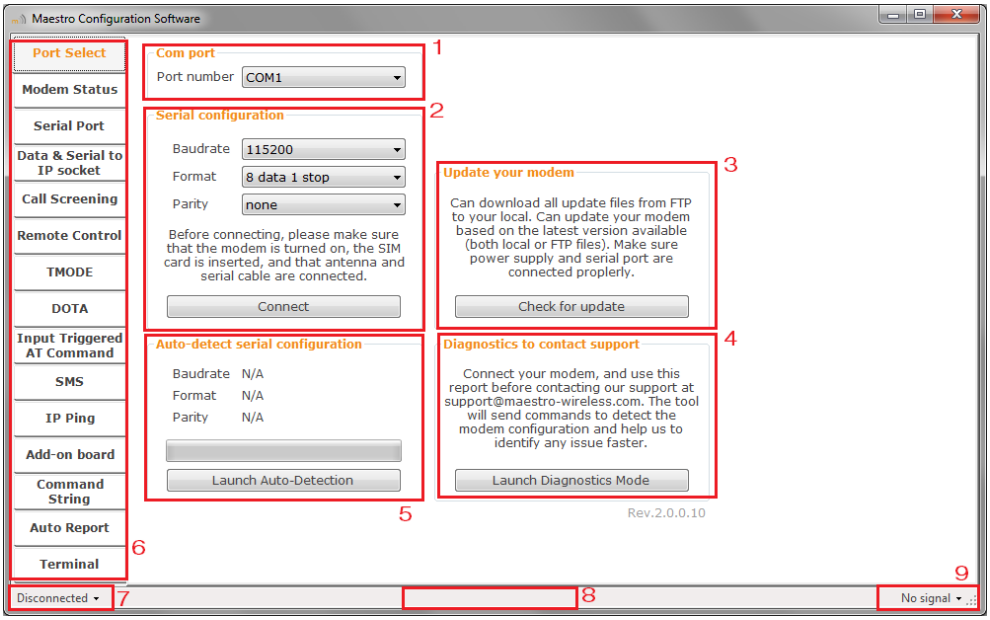

Figure 5.2.1: Start page - Maestro Configuration Software

6. **Menu tab page:** once connected menu will show ready for use and could do configuration of all modem features.
7. Quick connect/disconnect button.
8. **AT command sent status message:** will show the current AT command sent to the modem for a quick debug.
9. Quick signal strength overview which can be deactivated.

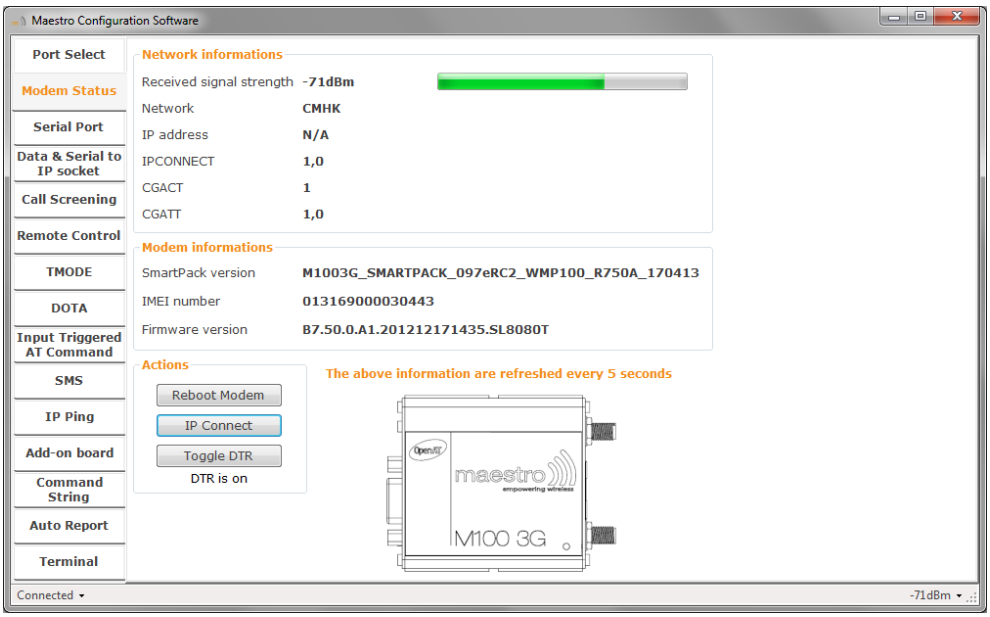

Figure 5.2.2: Status page - Maestro Configuration Software

Once connected, the interface will switch to the “Modem Status” page, see Figure 5.2.2, displays the reception signal strength (RSSI, refreshed every five seconds), your SIM card network name, as well as the revision number for the embedded application and firmware.

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The Maestro Configuration Software add an easy to configure interface to all the SmartPack features, detailed as:

- **Data & Serial to IP socket**: AutoTCP/UDP, IP packet settings, ...
- **Call Screening**,
- **Remote control**: both SMS and TCPTerminal, and Dynamic DNS,
- **TMODE**,
- **DOTA**,
- **Input triggered AT command**,
- **SMS:** for both reading and sending in Text mode, and AutoPIN,
- **IP Ping**,
- **Command String** scripting language,
- **GPS** for M100 3G XT (will be added by Q4 2013).

The last and not least page of the Maestro Configuration Software is the Terminal, which is a Windows HyperTerminal replacement with log, quick command features, see Figure 5.2.3.

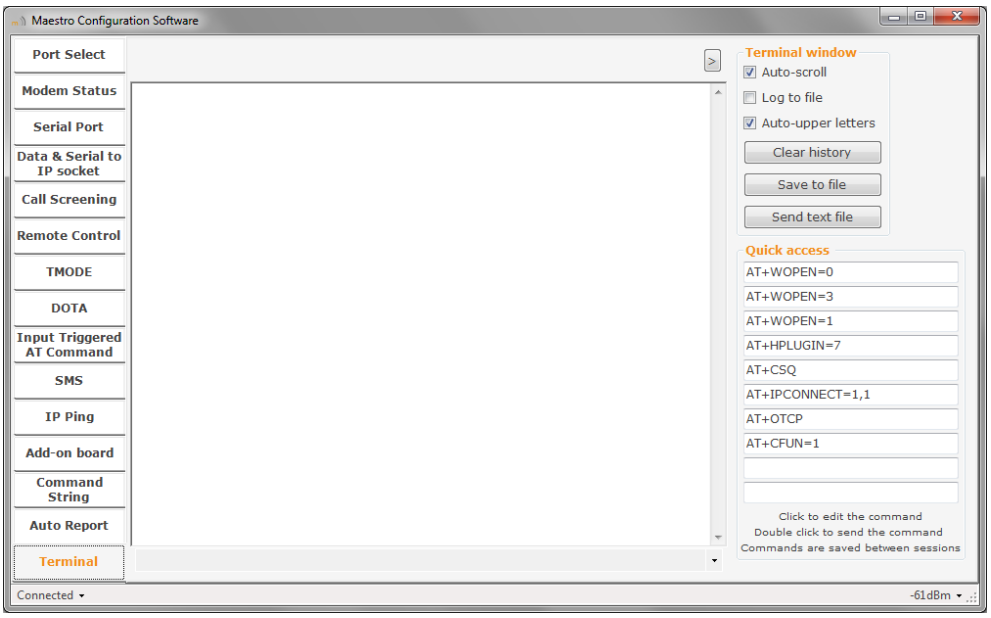

Figure 5.2.3: Terminal page - Maestro Configuration Software

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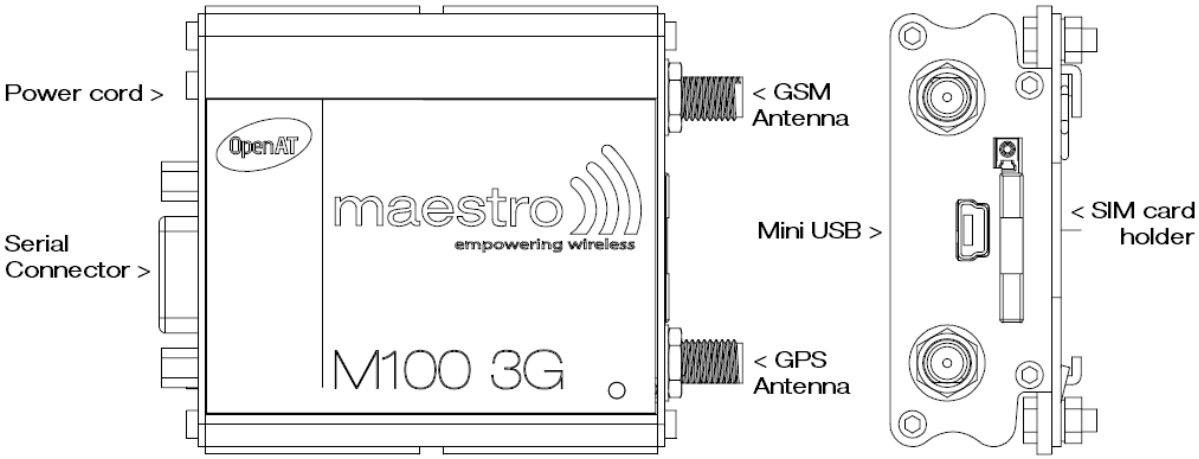
Chapter 6

Equipments description

6.1 Interfaces



Above picture reflects real device dimensions.

6.1.1 Status indicator

The LED will indicate different status of the modem:

- OFF: modem is switched off,
- ON: modem has no network and GPS doesn't have a fix,
- ON, and OFF pulse every 10 second: modem has no network and GPS has a fix,
- Flashing slowly: modem is registered on the network and GPS doesn't have a fix,
- Flashing rapidly: modem is registered on the network and GPS has a fix.

6.1.2 SMA female antenna connector

- GSM SMA female connector: fits penta band 850/900/1800/1900/2100MHz antenna with impendance of 50Ω,
- GPS SMA female connector: fits active or passive GPS antenna with impedance of 50Ω.

Note: Make sure to install GSM and GPS antennas with an angle of at least 90º to avoid disturbance.

▲ Important note the Engineering Sample support only passive GPS antenna ▲

6.1.3 Mini USB B Female connector

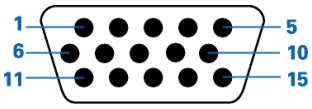
USB port is used for data communication and configuration, driver package is available for Windows XP, 7, Android and Linux. Please make sure you install the driver package *(File: USBDriverInstallerV3841.exe)* before plugging the device in. If you already plug it in, please reinstall the driver using those from the package, and plug your unit back.

USB will enable and emulate a Device, a Network Adapter and multiple COM Port on computer to access:

- CNS port,
- DM port,
- NMEA port,
- and AT command port.

6.1.4 15-Pin D-Sub Female connector (RS232/Audio)

This connector provides serial link and audio link to the modem.



Pin Number	Name	EIA designation	Type	Note
1	**N/A**	Data Carrier Detect		available with R7.53 firmware
2	TxD	Transmit Data	Input	
3	NC			
4	MICROPHONE +		Input	With 2VDC bias output
5	MICROPHONE -		Input	With 2VDC bias output
6	RxD	Receive Data	Output	
7	**N/A**	Data Set Ready		available with R7.53 firmware
8	**N/A**	Data Terminal Ready		available with R7.53 firmware
9	GND	Ground	Ground	
10	SPEAKER +		Output	
11	CTS	Clear To Send	Output	
12	RTS	Request To Send	Input	
13	RI	Ring Indicator	Output	
14	RESET		Input	Pull low for 100ms to reset, module require 5-7s to reboot
15	SPEAKER -		Output	

Specification of microphone and speaker to be connected:

Parameters	Min	Typical	Max
Microphone current @ 2V/2kΩ		0.5mA	
Microphone input level			100mVpp
Speaker output current 150Ω/1nF		16mA	
Speaker impedance	32Ω	50Ω	

Please refer to the document "Application note - Power supply & Audio" for more information about audio connection.

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6.1.5 4-Pin Micro-fit Molex connector (Power and input/output)

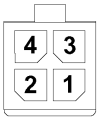
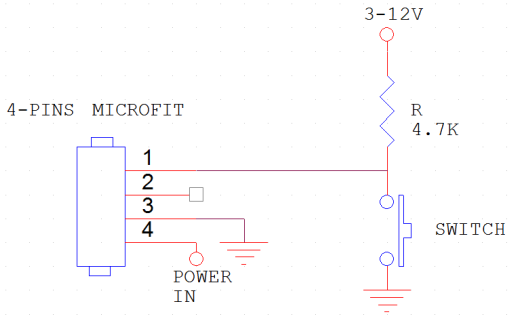


Figure 6.1.1: Pin assignment of 4-Pin connector

Pin number	Name	Functions
1	DIO1	Digital Input/Output (**3V** for input detection, **12V max.**)
2	DIO2	Digital Input/Output (**3V** for input detection, **12V max.**)
3	POWER -	DC power negative input (or ground)
4	POWER +	DC power positive input (5V to **32V max.**)

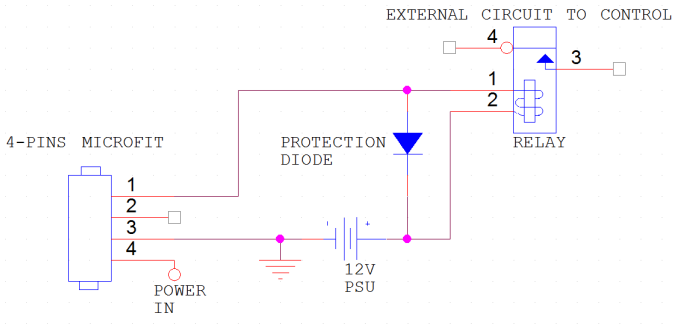
Digital Input/Output wiring diagrams

Example of DIO1 used as input to sense a switch:



- Output needs to be open when using as an input.
- Input is high when voltage is over 3V and low when voltage is below 0.5V.

Example of DIO1 used as output to control an external relay circuit:

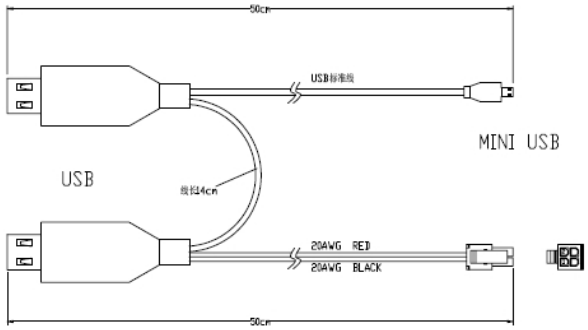


- Output is open collector, shorted to the ground, external power supply needs to be added in current driven application, maximum current is 200mA.
- If used to control relay, a protection diode needs to be added in parallel of the relay coil to avoid current peak when triggered.

6.2 Optional accessories

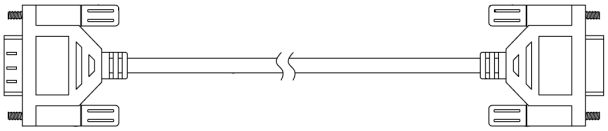
You may contact your sales agent for the following optional accessories:

USB 'X' Cable - ACC-CA41



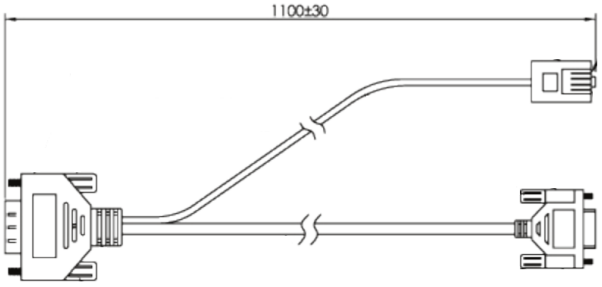
- Direct connection with standard USB for power and data channels
- Shielded cabled
- Cable length 50cm
- **Make sure the current given to the USB connectors from computer is sufficient, especially while in 3G communication**
- **Using USB 'X' Cable may alter performance of the M100 3G if used in very poor area or with too low power supplied**

DB15 Serial cable - ACC-CA01



- Direct connection with standard 9-pin RS-232 port (DTE)
- Shielded cable
- Cable length 1.1m (w/ connector)

'Y' cable - ACC-CA14A



- Direct connection with standard 9-pin RS-232 port (DTE)
- Direct connection with common handset of telephone for voice call
- Shielded cable
- Cable length 1.1m (w/ connector)

Power cord with fuse - ACC-CA10

- 4-pin Microfit connector
- 1m AWG20 cables with stripped wire end
- 2.5A glass fuse with plastic holder

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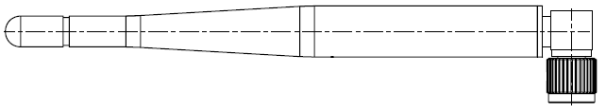
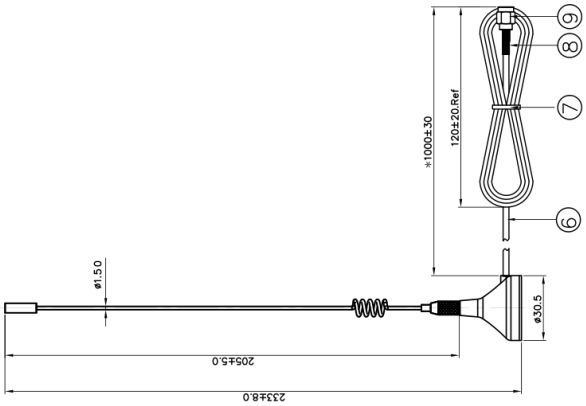
Penta-band L-shape antenna - ACC-A11



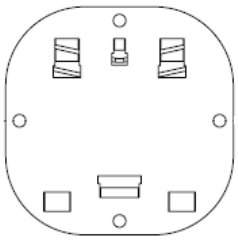
- Frequency bands: 850/900/1800/1900/2100MHz
- Antenna Gain
  - 2.0 ± 0.7dBi @ 880MHz
  - 1.0 ± 0.7dBi @ 1990MHz
- Polarization Linear

Penta-band antenna - ACC-A17A



- Frequency bands: 850/900/1800/1900/2100MHz
- Gain +1dBi
- Antenna Gain
  - 1.0 ± 0.7 dBi @ 824~960MHz
  - 0.5 ± 0.7 dBi @ 1710~2170MHz
- Polarization Linear
- Cable length 1m (w/ connector)

DIN rail mount - ACC-DIN



- SPCC steel
- Thickness: 1.2mm

DB15 to DB9 adapter - OTH-004

- Plastic molded with screws
- Length: 36mm (w/ connector)

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Chapter 7

Default firmware settings

7.1 Factory settings

The modem has the following factory settings. Please refer to the AT command document for the meaning of each setting.

Related AT commands	Factory settings	Description
AT+IPR	115200	DTE-DCE data rate
AT+IFC	2,2	DTE-DCE flow control
AT+ICF	3,4	DTE-DCE character framing
ATE	1	ECHO
ATQ	0	Result code suppression
ATV	1	Response format
ATS0	0	Auto answer
AT+CSCS	“PCCP437”	Character Set
AT+CMGF	1	Short message format

7.2 Digital Input/Output ports

> /!\ **Important notice:** This section concern only OpenAT developer that will need to control GPIOs from their application, else the Maestro SmartPack will control GPIOs through SmartPack AT commands.

Inputs are mapped in OpenAT to: **GPIO01** for DIO1, **GPIO03** for DIO2.

– To setup DIO1 as an input, type **AT+WIOM=1,"GPIO01",0** on the serial port. Then to read the status of the input, type **AT+WIOR="GPIO01"**. *+WIOR: 1* means input is below 0.5V while *+WIOR: 0* means a positive voltage of more than 3V. Higher voltage than 12V will damage the unit.

Note: Please note that the output port need to be set as open for the input to work.

Outputs are mapped in OpenAT to: **GPIO06** for DIO1, **GPIO05** for DIO2.

– To setup DIO1 as an output, type **AT+WIOM=1,"GPIO06",1** on the serial port. Then set the state of the output with **AT+WIOW="GPIO06",0** to set the output as open, or **AT+WIOW="GPIO06",1** to set the output as close.

7.3 RS232 auto-online mode (power saving)

When on auto-online mode, the RS232 transceiver will shut down most of its hardware, to save power, if it does not detect a valid input for more than 100μs. The RS232 transceiver will wake up when valid input is detected again. By default, auto-online mode is not active. To activate it, issue **AT+WIOM=1,”GPIO02”,1,0** followed by **AT+WIOM=4**. This setting needs to be set once, and will be saved in memory.

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Chapter 8

Troubleshooting

8.1 The modem's LED does not light

- Check if the modem has been properly connected to a 5-32V power supply
- Check if the power connector is properly inserted
- Check the fuse in the power cord

8.2 The modem's LED lights but does not blink long time after power up

- Check if a valid SIM card has been properly inserted
- Check if the SIM card has been locked (refer to AT+CPIN command in AT command guide)
- Check if the external power has been properly connected to the modem
- Check if the network coverage is available
- Make sure that the CTS and DTR pins of the serial port are not connected together

8.3 The modem does not respond to the terminal program

- Check if the RS232 cable has been properly connected
- Check if your program has proper settings. Factory setting of the modem is:
  - 115200 bps
  - 8 data bits
  - No parity bit
  - 1 stop bit

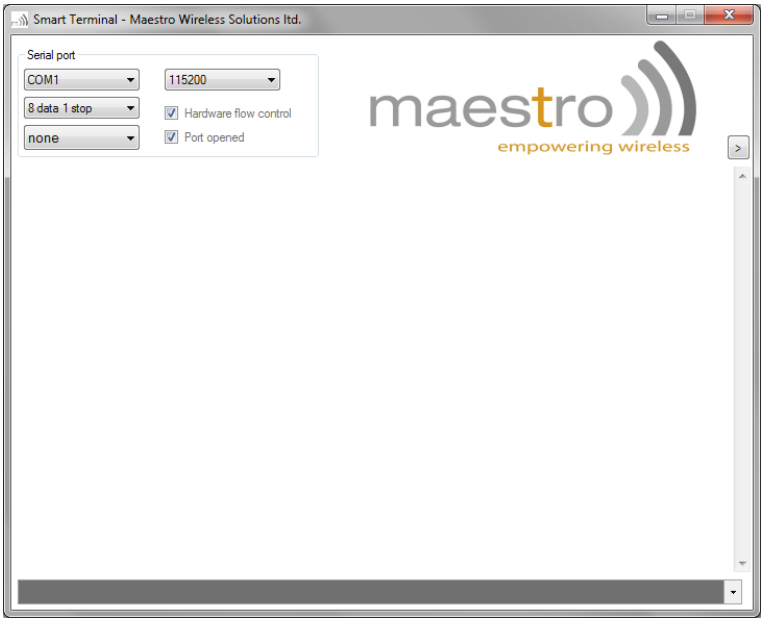
8.4 No voice could be heard for the modem's speaker output when a call is answered

- Make sure a voice call has been made (refer to AT command guide)
- Enter the AR+SPEAKER=2 command

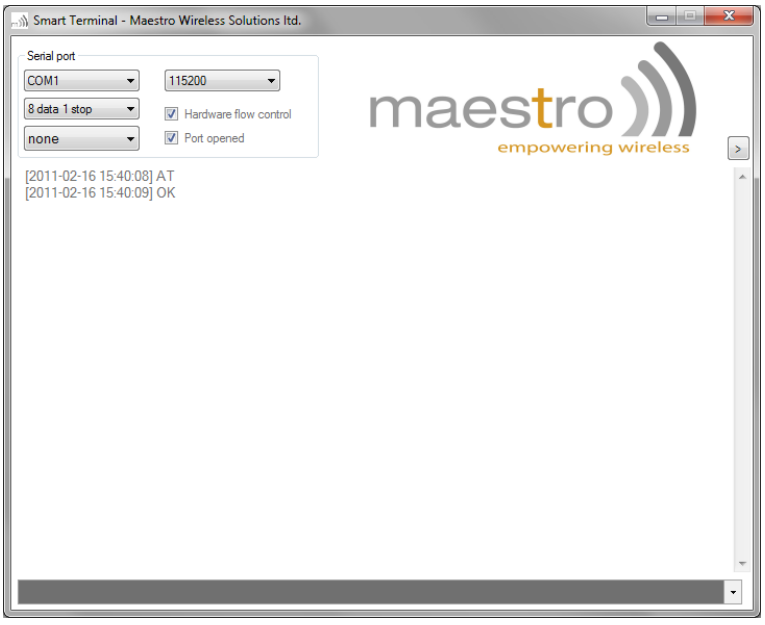
8.5 Debug, or further command using Smart Terminal as example

First, you can find our Hyper Terminal substitute at the following address: `http://www.maestro-wireless.com/smart-terminal`. Then follow the steps:

- Open the software, you can find the shortcut on your desktop, or access it by the Start menu > All Programs > Maestro Wireless Solutions > Smart Terminal.
- Once open you will have to select the good serial port configuration (By default: COM1, 115200, 8 data 1 stop, none, with hardware flow control)
- Open the port by ticking the Port opened box :



- Then you can type command like “AT” and check the "OK" response from the modem.



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8.6 Basic operations

Followings are examples of some AT commands. Please refer to the AT command document for a full description.

Note: Issue AT+CMEE=1 to have extended error code (+CME ERROR)

Description	AT commands	Modem response	Comments
Network registration checking	AT+CREG?	CREG=<mode>,1	Modem registered to the network
		CREG=<mode>,2	Registration lost, re-registration attempt
		CREG=<mode>,0	Modem not registered on the network, no registration attempt
Receiving signal strength	AT+CSQ	+CSQ:20,0	The first parameter has to be at least 15 for normal communication
Receiving an incoming call		RING	An incoming call is waiting
	ATA	OK	Answer the call
Make a call	ATD1234567;	OK	Communication established (Don't forget the ";" at the end for "voice" call)
		+CME ERROR: 11	PIN code not entered (with +CME=1 mode)
		+CME ERROR: 3	AOC credit exceeded or a communication is already established
Make an emergency call	ATD 112;	OK	Communication established (Don't forget the ";" at the end for "voice" call)
Communication loss		NO CARRIER	
Hang up	ATH	OK	
Enter PIN code	AT+CPIN=1234	OK	PIN Code accepted
		+CME ERROR: 16	Incorrect PIN code (with +CME=1 mode)
		+CME ERROR: 3	PIN already entered (with +CME=1 mode)
Saves parameters in non-volatile memory	AT&W	OK	The configuration settings are stored

8.7 Failsafe factory reinstall using USB Binary Update Tool

In case your modem firmware is crash or can't be flash via Serial port, Maestro Wireless can provide a binary update tool using USB, please contact support@maestro-wireless.com to receive those files.